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## WHITE PAPER

# AIR FORCE PERFORMANCE IN DESERT STORM

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# Air Force Performance in OPERATION DESERT STORM

Everyone witnessed the success of the coalition Air Forces in Operation Desert Storm. From the early hours over Baghdad to the final minutes in Kuwait City, the United States Air Force proved it is the world's best. This effort did not just happen. It was the result of a concerted effort over the past twenty years -- twenty years of hard work and commitment to excellence. Quality people, quality equipment, quality training and quality leadership created this force and assured Air Force success during Operation Desert Storm. Environmental impacts -- heat, sand and fine dust -- were less significant than anticipated. Aircraft, weapons, and ground and aircrews performed and survived even better than predicted. Motivated people proved that flexibility is the key to airpower. Ingenuity, cooperation with industry, and reliable weapons systems enhanced that flexibility. This report captures the flavor of USAF system and personnel performance in Desert Storm. It highlights the performance of a cross section of resources from combat aircraft and combat support to the role of Air Force engineers, logisticians, and space assets. It is not a comprehensive report on capabilities, but an initial report of how the "1100 hour war in the desert" was won.

## Combat Systems

Much of the prewar debate centered around whether the military had the right doctrine, was buying the right equipment, and could operate effectively in a coalition force. Desert Storm showed that Air Force equipment and doctrine were up to the task. It also demonstrated the U.S. Air Force could integrate effectively into what was the largest coalition air effort since World War II. In this integrated air campaign, coalition air forces quickly gained and maintained air superiority. This achievement opened opportunities for coalition forces to employ the versatility of airpower to meet other military objectives. Airpower destroyed the Iraqi Integrated Air Defense system and those Iraqi pilots who chose to fly. After gaining air superiority, coalition forces proceeded to destroy the strategic industrial and military targets which keep a military running. Electricity, oil, communications, supply depots and transportation nodes are vital to any nation's

ability to use military power. As these strategic targets were destroyed, coalition air forces focused their fire power on enemy forces on the battlefield. The destruction of bridges, tanks, artillery, and other military hardware in the Kuwait Theater of Operations (KTO) demonstrated of how effectively this can be done with modern airpower.

Without air superiority, the full spectrum of airpower could not have been applied against the right targets to avoid casualties and leverage our high-tech advantages. Employing a single Air Tasking Order, CINCCENTCOM selectively employed his best platforms, armed with the most effective munition to attack the target. He used every joint and coalition asset to accomplish the war objectives. Desert Storm revalidated many doctrinal precepts. This war proved U.S. military forces had the quality people, equipment, leadership and training required to fight and win. By employing assets in a well-conceived plan, Desert Storm was won and Kuwait was again free.

As was demonstrated, airpower offers the ability to quickly and quietly respond to any crisis. F-15s were sitting alert, ready to fly defensive patrols along the Iraqi-Saudi border, 7000 miles from their departure bases within 38 hours of notification to deploy. Within five days strategic airlift moved five fighter squadrons, a contingent of AWACS, and an 82 ABN Brigade to the CENTCOM area of responsibility (AOR). Within 35 days, the Coalition Air Forces had a fighter force that equalled Iraq's fighter capability. The global reach of the Air Force allowed the United States to mass its military power rapidly and to immediately project combat power in this part of the world. Once combat power was in place, it could either defend friendly areas or attack an adversary.

The Air Force flew over 65,000 sorties during Operation Desert Storm and accounted for 31 of 35 kills against fixed wing aircraft. It's estimated that during the Air Campaign, coalition forces destroyed over 400 Iraqi aircraft, including 122 that flew to Iran, without a single loss in air-to-air combat. The Air Force flew 59% of all sorties, with 50% of the assets and incurred only 38% of the losses. The mission capable rate for Air Force aircraft was 92% -- higher than our peacetime rate.

**F-117** Before CNN's initial reports of the air war over Baghdad, the F-117 was a stellar performer. Dropping the first bomb of the war on an air defense control center, the F-117 provided us the advantage of surprise. Often the Iraqis would not start shooting until the bombs exploded. With the ability to cruise to the target, identify it before surface threats became active, and hit it with precision, the F-117 was an extraordinary fighter-bomber. Although it represented only 2.5% of the shooters in theater that first day, it hit over 31% of the targets. During the war, it flew almost 1,300 combat sorties, dropped over 2,000 tons of bombs, flew over 6,900 hours and demonstrated accuracy unmatched in the history of air warfare. The value of the F-117 was that it combined stealth technology and precision delivery. With the use of tactical surprise, the F-117 helped assure air superiority over the Iraqi skies as it destroyed command and control capabilities, the Iraqi Integrated Air Defense System, aircraft shelters, and valuable strategic targets in Baghdad and Iraq. Baghdad was more heavily defended than the most highly defended Warsaw Pact sites in Eastern Europe during the height of the Cold War. The F-117 was the only aircraft to operate in this environment over downtown Baghdad. Precision delivery assured the F-117 could destroy those targets in a single mission with great lethality. Despite its heavy use, the F-117 had a mission capable rate of 85.8% for the war -- 4% higher than in peacetime.

**F-15** During Desert Shield, F-15s provided the defensive umbrella that permitted the deployment of air, land and sea assets into the AOR. After D-Day, they shifted to offensive counterair attacks against Iraqi Air Force and helped gain air supremacy within the first ten days of the war. Every Iraqi fixed wing aircraft destroyed in air-to-air combat by the Air Force was a "kill" for the Eagle. Their success permitted coalition air forces to exploit the versatility of airpower over the entire battlefield. The 120 F-15 C/Ds deployed to the Gulf flew over 5,900 sorties and maintained a 94% mission capable rate -- 8% higher than in peacetime.

**F-15E** Forty-eight of these multi-role fighters were deployed to the Gulf. The F-15E's flexibility was the key to its success. The F-15E proved its versatility by hunting SCUD missiles at night, employing laser systems to hit hard targets and attack armored vehicles, tanks and artillery. It proved unusually effective with the Joint Surveillance Target and Attack Radar System (JSTARS) for cueing on SCUD locations and using Low-Altitude Navigation

and Targeting Infrared for Night System (LANTIRN) to locate and destroy the missiles and launchers. Its overall mission capable rate was 95.9% -- 8% higher than in peacetime. These aircraft deployed with LANTIRN navigation pods (permits accurate navigation at night across featureless terrain to the target area without the need for active navigation aids). Subsequently the targeting pods were deployed. During Desert Storm, the F-15E accomplished Operational Test and Evaluation of the LANTIRN system with spectacular results. Their primary targets were SCUDs, command and control links, armor, airfields and road interdiction. While flying over 2,200 sorties, only two were lost in combat.

**A-10** The Air Force deployed 144 A-10s into the AOR. Air superiority allowed innovative employment of A-10s in a variety of roles. Primarily killing tanks in an interdiction role, the A-10 proved its versatility as a daytime SCUD hunter in Western Iraq, suppressing enemy air defenses, attacking early warning radars, and even recorded two helicopter kills with its gun -- the only gun kills of the war. While the A-10 flew almost 8,100 sorties, it maintained a mission capable rate of 95.7% -- 5% above its peacetime rates. Despite numerous hits and extensive damage, the A-10 proved it could do a variety of missions successfully.

**F-111** Turning in an outstanding performance, the F-111 again proved itself to be a workhorse not only in the interdiction and strategic attack roles but across the spectrum of ground attack missions. With its FLIR (Forward Looking Infrared) and laser designation system, the F-111F attacked key military production facilities; chemical, biological, and nuclear sites; airfields, bunkers, C3 assets, and portions of the integrated air defense system with great success. Attacking bridges, hardened aircraft shelters, and individual tanks, armored vehicles, and artillery, it was a stellar performer. In what became known as "tank plinking" the F-111s were credited with over 1500 verified armor kills. In over 4,000 sorties, the 84 deployed F-111s had a mission capable rate of over 85% -- approximately 8% higher than peacetime rates. One Wing Commander reported that his unit flew over 2100 sorties with no maintenance non-delivers. These platforms delivered the precision munitions on the manifolds which stopped the oil Saddam was dumping into the Gulf. Overall, the F-111 proved to be a versatile, precise, survivable platform which made significant contributions to the success of the air war.

**Electronic Combat** With EF-111s Ravens and F-4Gs Wild Weasels, the Air Force blinded Iraq's Integrated Air Defense System. The 18 EF-111s in the AOR flew over 900 sorties with a mission capable rate of 87.5%; and the 48 F-4Gs flew over 2,500 sorties with a 87% mission capable rate. Because the Iraqis feared the F-4G and its HARM missile, they made brief, limited and ineffective use of their radars. When they did choose to operate these radars, the effective jamming of the EF-111 negated their ability to track, acquire, and target attacking aircraft. Every day the Weasels and Ravens supported shooters as they attacked their targets in Iraq and the Kuwaiti Theater of Operations (KTO). One sign of their success was that after day four, all allied aircraft operated with impunity in the mid to high altitude environment across the AOR. By decreasing the threat of SAMs to our strike aircraft, EF-111s and F-4Gs permitted aircraft to deliver their weapons from an environment where they can be very lethal.

**F-16** The F-16 Fighting Falcon proved itself to be a versatile platform which can attack targets day or night -- in good or bad weather. Two hundred and forty-nine F-16s were deployed to the Gulf. These aircraft flew almost 13,500 sorties -- the highest sortie total for any system in the war -- and maintained a 95.2% mission capable rate -- 5% above its peacetime rate. F-16s attacked ground elements in the KTO, flew SCUD missions, and destroyed interdiction targets, such as military production and support and chemical production facilities, and airfields. The 72 LANTIRN capable (Navigation pods only) F-16s were a real success story. LANTIRN's mission capable rate was over 98%. Past emphasis on reliability and maintainability paid dividends here.

**B-52** The role of the large conventional bomber was revalidated in the Gulf war. B-52s flew 1,624 missions, dropped over 72,000 weapons, and delivered over 25,700 tons of munitions on area targets in the KTO, and on airfields, industrial targets, troop concentrations and storage areas in Iraq. Despite being over 30 years old, the B-52 had a mission capable rate of over 81% -- 2% higher than its peacetime rate. B-52s dropped 29% of all US bombs and 38% of all Air Force bombs during the war. Through effective modification of the B-52, it remains a useful platform. As Iraqi prisoners report, B-52 raids had devastating effects on enemy morale. Estimates show that from 20 to 40% of troop strength had deserted their units prior to the G-Day. While fighters employed precision guided munitions to destroy pinpoint targets, the B-52s successes demonstrated the need to preserve the large

conventional bombers' ability to destroy large area targets.

**Special Operations** Elements of all AFSOC units deployed to Desert Storm and performed a variety of missions, including infiltration, exfiltration, and resupply of Special Forces Teams on direct action missions; rescue of downed crew members; psychological operations (PSYOPS) broadcasts; dropping 15,000 pound bombs; and supporting counterterrorist missions. Over 50 SOF assets were deployed, including helicopters and AC/EC/MC/HC-130s. These assets flew over 830 missions to support CENTCOM. SOF crews recovered downed crew members and provided valuable target identification and human intelligence (HUMINT) work. MH-53J Pave Lows also acted as a pathfinder for the Army Apaches that attacked the radars in Iraq during the first hours of the war. One AC-130 was lost during the war.

The individual performance of Air Force aircraft was overshadowed by the people who fly and maintain these aircraft. Their accomplishments reflect the pride, professionalism, and skill of a well trained force which had the right equipment to counter modern battlefield threats and was led by leaders who understand how to employ those forces. This coupling of quality equipment and well trained people led by visionary leaders who understand how to apply airpower is the real success story of Desert Storm.

## Munitions and Missiles

Aircraft get you to the target area, but effective munitions destroy the targets. Vital centers of industrial power were vulnerable to pinpoint attacks. Military equipment and infrastructure were destroyed across the width, depth and breadth of the battlefield with impunity and at a time of our choosing. Once air superiority was gained, every sanctuary and every prerogative was vulnerable to airpower. The success of the F-117 during the first few hours to blind and incapacitate the Iraqi military was the death knell in this war.

**Precision Guided Munitions** (PGMs) Denying the enemy sanctuary has always been a goal of airpower, and magnifies the effectiveness of an air campaign. U.S. pilots used 7,400 tons of precision munitions with deadly effectiveness. Approximately 90%

were dropped by the Air Force. F-111s employed GBU-12s to destroy over 150 armored vehicles a night during the last few weeks of the war. F-117s used GBU-27s to hit hard targets such as aircraft shelters, bunkers, and other strategic targets in Baghdad. F-111s and F-15Es used GBU-24s to destroy chemical, biological and nuclear storage areas, bridges, aircraft shelters and other strategic targets.

Precision munitions highlight the lethality of modern air-power. On several occasions, a two-ship of F-15Es with 16 bombs destroyed 16 tanks. When one bomb equals one shelter or a tank -- the message quickly spread that every sanctuary had been eliminated by airpower. After the commencement of the shelter campaign, Iraqi pilots voted with their afterburners to get out of the war. But, not every target requires a precision weapon. The ability to use the right weapon on the correct target shaped the outcome of the air war. When it was important to avoid collateral damage, civilian casualties, or to directly hit a target, PGMs were the right choice. F-117 attacks over Baghdad demonstrated the ability to precisely kill military targets while minimizing civilian casualties.

**Maverick** The Maverick missile, used by the F-16 and A-10, attacked armored targets. This missile has continually been upgraded to handle new threats and targets. The imaging infrared radar (IIR) Maverick's performance was crucial in the armor war. Since it only took one missile to destroy each Iraqi tank, a \$70,000 Maverick equated to a \$1.5 million T-72 tank. It is important to note that Iraq had more tanks than Germany and Great Britain combined. It was the fourth largest army in the world. Maverick, an older system which had been continually modified to keep pace with modern war, played a large part in the destruction of that significant military force.

**AIM-7/AIM-9** The AIM-7 proved to be an effective air-to-air weapon. Twenty-two enemy fixed wing aircraft were downed by AIM-7s. Through an aggressive product improvement program, the AIM-7 has become a more lethal weapon with a bigger launch envelope. The AIM-9 destroyed six enemy fixed-wing aircraft, and worked as advertised.

**High Speed Anit-Radiation Missile (HARM)** Its hard to assess the success of the HARM missile due to the Iraqi tactics used to counter it. The Iraqis understood that if a radar went on, a HARM

was on its way. This deterrent kept them from using their operable radars and control centers. Throughout the war, surface-to-air missile (SAM) sites would turn off their radars after launching missiles, leaving SAMs unguided as they flew toward their targets. Lethal SEAD (Suppression of Enemy Air Defenses) permitted us to operate from the mid to high altitude where aircraft were beyond anti-aircraft artillery (AAA) range.

## **Deployment, Sustainment and Resupply Efforts**

Airlift, tanker support, prepositioning of supplies, and a large, modern, base infrastructure permitted movement of forces into the AOR, and provided the ability to operate quickly from Saudi Arabia. These forces assured we had the "global reach" and support to exercise "global power."

**Strategic Airlift** Desert Storm was the largest airlift since World War II. Airlifters moved combat forces half way around the world. By the cease fire, airlift had moved over 482,000 passengers and 513,000 tons of cargo into the AOR -- the equivalent of moving Oklahoma City, all of its people, all of its vehicles, all of its food, and all of its household goods halfway around the world.

Air Force C-5s and C-141s, moved 72% of the air cargo and about one-third of the people while commercial augmentation moved the rest. C-5s were 90% and C-141s 80% committed to Desert Storm. The remainder of Air Force airlift flew other high priority DOD missions to the rest of the world. This operation was the first time in its 38 year history that the Civil Reserve Air Fleet (CRAF) was activated. On 18 August, the first stage of CRAF, 18 passenger and 23 cargo aircraft, was activated. When fighting commenced, the second stage, 77 passenger and 40 additional cargo aircraft, were activated. These commercial carriers provided additional airlift capacity needed to meet CENTCOM's requirements. These commercial aircraft carried the majority of the troops to the AOR.

Strategic airlift forces have been going at full speed since Desert Storm started and will continue until our forces are redeployed home. Airlifters with Airlift Control Elements were the

first to land in the Arabian Peninsula and will be the last to leave. Many of these people are Guardsmen and Reservists who have twice demonstrated their patriotism during the past 18 months -- in Panama and now the Arabian Peninsula.

**Air Refueling** The rapid deployment of fighter aircraft to Saudi Arabia resulted from Air Force tanker capability. Within 38 hours of the deployment notice, the first F-15 aircraft had landed in Saudi Arabia and were ready to defend the Persian Gulf area. The Strategic Air Command deployed 256 KC-135s and 46 KC-10s into the AOR during the war. In Desert Shield, tankers flew 4,967 sorties and 19,089 hours, refueled 14,588 receivers, including 5,495 Navy and Marine aircraft, and offloaded 68.2 million gallons of fuel. Tankers surpassed this effort during the six weeks of Desert Storm when they flew 15,434 sorties, logged 59,943 hours, refueled 45,955 aircraft and offloaded 110.2 million gallons of fuel. Approximately 20% was used for Navy and Marine receivers. Every aircraft -- fighter, bomber, airlift, AWACS, or JSTARS -- and every service and some allies used Air Force tankers to do their mission. One F-15 pilot commented about tanker accessibility: "There was more gas in the sky over Saudi than in the ground below" -- a testimony to the tanker force. No other nation has such a capability.

**Prepositioning and Base Infrastructure** Saudi Host Nation Support was superb. During the past decade, whole bases were built, stocked and prepared for war. These locations made it easy for forces to quickly move from a deployment phase to full combat operations. The Gulf Cooperation Council provided fuel and many other materials. In other locations, the Air Force operated from open runways. There, civil engineers literally built cities on the sand. During the past decade, the Air Force developed tents, hospitals, supply areas, ramps and other base essentials had been developed as modular buildings. This investment guaranteed operation from austere locations anywhere around the globe. Afloat and ashore prepositioning included bare base and fuels equipment, supplies, vehicles, and munitions which were required to sustain and project Desert Storm forces. These supplies saved an estimated 1,800 airlift missions to the AOR and provided prepositioning of supplies and base infrastructure for 21 principal airfields.

**Theater Airlift** Over 145 C-130s deployed to support Desert Storm. These aircraft moved units forward as they deployed into the theater. From 10 August to the 2 April, C-130s flew 46,500 sorties, logged over 75,000 hours, and moved over 209,000 people and over 300,000 tons of cargo. Once the fighting started, they provided logistical support, medical evacuation of wounded, and battlefield mobility through airland and airdrop. During the ground campaign, C-130s flew over 500 sorties a day. During Desert Storm, C-130s had a mission capable rate of 84% -- 6% higher than in peacetime.

## Command and Control

Desert Storm employed a wide variety of new Space and Intelligence assets to ease mission planning, command and control of the air war, provide real-time identification of ground targets for shooters, and assure the coalition gained and maintained the initiative. Both space and intelligence platforms were force multipliers in Desert Storm.

Desert Storm was America's first comprehensive Space supported war. The prudent investments of the past decade were justified as space provided weather information, reliable navigation support, warning of possible threats, and secure, rapid communications. Until recently, space focused primarily on providing strategic warning, surveillance, communications and arms control verification. Today, even the tactical commander realizes the benefit space assets provide to conventional warfare.

**Defense Meteorological Support Program** DMSP assured commanders had high resolution, near real-time weather information about sand storms and other unusual phenomena in the Gulf area, and could accurately predict target weather throughout the war. DMSP was crucially important this year as the weather over Baghdad and Kuwait was the worst in the last 14 years. It also provided the first glimpses of Saddam's ecoterrorism of the Gulf waters and its air. CINCCENTCOM and his staff fully integrated these capabilities into their planning and execution of the war effort.

Global Positioning System (GPS) Without reliable navigation, no precision weapon could have been employed. Aircraft must get to the target area before they can effectively use their weapons. GPS provided accurate guidance to the target area for air, land and naval forces. Although the whole constellation will not be completed until FY93, American forces had three-dimensional coverage for 18 hours a day, and two-dimensional coverage 24 hours a day. GPS provides the Air Force with the ability to traverse all parts of the globe to deliver precision munitions.

Defense Satellite Communications System (DSCS) Throughout history, communication has been a shortfall during war. The need to communicate easily and securely is crucial to prosecuting military operations. During Desert Storm, DSCS was the workhorse providing both inter- and intra-theater communications. With over 100 ground tactical terminals to support theater operations, the Air Force was able to provide a full range of secure and non-secure voice and data capability to Desert Storm commanders. Even though the communications requirements increased by a factor of thirty, DSCS assured our tactical commanders had the ability to communicate wherever and whenever they wanted. Overall, the first space war was an unqualified success.

Just as Space played a significant role in this war, our Intelligence assets changed the way we prepare for war and fight. Four systems -- the Mission Support System, AWACS, and JSTARS -- provided timely information and support for air, ground and naval forces during Desert Storm.

Mission Support System This system provided integrated mission planning support for Air Force pilots. While it took a couple of days to plan a mission in Vietnam, it was now possible to prepare a pilot for a mission in four hours. Charts, maps, threats, and other vital data were integrated through this system into every squadron involved in Desert Storm. Through its reliability, it became a command and control asset for planners in the CENTCOM staff. Many units found innovative and creative ways to better use this asset.

Tactical Digital Facsimile (TDF) Critical to crews and commanders, it provided the capability to send high resolution pictures and other data. It is a secure, reliable and versatile force multiplier which can relay near real-time data vital to combat success to the pilot. Much maligned before the war, the investment was well

worth the money. The TDF was today's telephone to the modern battlefield commander.

**AWACS** From 16 January to the cease fire, AWACS flew four continuous orbits to control over 3,000 sorties a day while maintaining a mission capable rate of 98% -- 9% higher than in peacetime. Despite multiple Air Forces and languages involved in the coalition, not one instance of friendly air-to-air fratricide resulted -- a tribute to AWACS effectiveness. It was an AWACS vector which positioned the Saudi F-15 to kill his two F-1s. Just as it patrolled the Persian Gulf skies from 1980 to 1989, AWACS proved to be an invaluable asset to control the air war. It was very effective in target pairing and declaring hostile threats.

**JSTARS** This program had not finished its Developmental Test and Evaluation prior to its deployment to Saudi Arabia in mid-January. JSTARS proved to be a spectacular success. These two test aircraft flew 54 combat sorties, supported 100% of mission taskings with a system availability rate of over 80% and had a mission capable rate of 84.5%. JSTARS tracked everything that moved on the ground. From D-Day to G-Day, JSTARS operators logged over 535 hours to locate, identify and target assembly areas, POL storage sites, SCUD areas and missiles, convoys, trucks, tanks, and even SAM sites and artillery for Allied fighters. Coupled with F-16s, JSTARS enhanced the kill box approach to air interdiction which proved so effective in destroying Iraqi equipment in the KTO. When used with F-15Es, F-16s and F-111s, JSTARS effectively denied the enemy its night sanctuary and kept continual pressure on ground troops in the KTO. Every commander agreed it was a spectacular success.

The large investments in intelligence and space assets to provide command and control over the battlefield and to provide information for all coalition forces were wise expenditures of taxpayer money. Lives were saved, assets better employed, and the full weight of joint forces were demonstrated in Operation Desert Storm. These initial efforts to merge new command and control capabilities with near real-time data will define the modern battlefield of the future.

## **Combat and Logistical Support Efforts**

**Civil Engineering and Community Services Support** The Air Force is a self contained community. Most city services, like road repair, building maintenance, meals, housing, and office space are provided by the Civil Engineers and Community Support Personnel. During Desert Storm, these people erected over 5,000 tents, constructed over 300,000 square feet of hard-wall facilities, laid over 500,000 square meters of concrete and asphalt, and served over 20 million meals. The beddown of over 1,200 aircraft and its personnel was a major achievement. Approximately 9% of all personnel deployed to the AOR were in Civil Engineering and Services. In one instance, they built a base from the ground up in forty days. As one Wing Commander noted "the tallest thing on the base when we got here was the two inch high taxiway lights." RED HORSE, PRIME BEEF, and Saudi contractors worked around the clock to build the base areas -- 380 tents, four field kitchens, a 50-bed hospital, tactical field laundry, 19 latrine/shower units, and a tactical field exchange. They even had to bring electrical power to the base. Without this support, aircrews at these bare bases could not have performed their mission.

**Medical Support** Just six days after the invasion of Kuwait, the first Air Force squadron medical elements and Air Transportable Clinics left for Saudi Arabia. In a very short time, the largest projection of medical personnel in American history was assembled in the Gulf. The first of 15 Air Transportable Hospitals arrived in theater within the week and was ready to receive patients within 24 hours. These 50 bed hospitals, together with a 250 bed contingency hospital, were the primary Air Force medical support in the theater. In Europe, four USAF Contingency Hospitals with 3,250 beds were prepared, staffed and ready for casualties while 2,178 beds were available in CONUS. Over 6,200 active duty medical personnel and 5,500 from the ARC deployed to Europe or the AOR. The Reserve forces also made a significant contribution in CONUS by augmenting medical treatment facilities with over 6,600 personnel. During Desert Shield and Desert Storm, almost 130,000 outpatient visits and 3,500 admissions were made in the AOR.

**Modifications and Logistical Audibles** During combat, new operational threats and requirements arise which must be countered. During Desert Storm, the Air Force worked hard to shorten

the time needed to meet new operational requirements. A rapid response process reduced the 2 to 12 year requirement process to less than six months for urgent and compelling needs. Fourteen percent of these requirements were for new capabilities unique to Desert Storm, while the remainder enhanced current warfighting capabilities. By using or adapting off-the-shelf equipment, the Air Force minimized risks with these systems. Through this system, many changes were made to upgrade computer software for aircraft and support equipment.

## Areas for Improvement

Regardless of the plan or the preparation, nothing ever goes as planned. This war was no exception. Clausewitz called these the "frictions" of war -- those forces which impede you from doing your job. One area involved the use of systems which the military cannot use during peacetime training -- to use them would compromise their capabilities. In Desert Storm some of these systems needed adjustments, but the deficiencies weren't known until the equipment was tested in the AOR. Quickly adjusted, these systems worked as advertised. Another area dealt with training munitions during the deployment phase. The Air Force did not deploy with sufficient training munitions. Without these assets, the ability to conduct training during the build up was limited.

Overall, BDA was a problem. It was not always timely. In addition, the Video Tape Recorders in many fighters did not have sufficient quality to permit accurate BDA. Less than half of all air-to-air kills could be confirmed through this system. The principal data recorded related to ground attack -- buildings, bridges, airfields, storage areas, tanks, artillery, trucks and armored personnel vehicles. Although these video recorders provided much of that data, with further refinement, new recorders could help overcome the BDA problems noted during the war.

Finally, tactical intelligence support was not always timely. Commanders complained about the excessive time it took to receive information at the units and the shortage of tactical reconnaissance assets. As we have increased the tempo and decision cycle of war, the ability to analyze post mission data has not kept pace. Intelligence at the theater level to support the mission with AWACS and JSTARS was excellent; but work is needed to ensure reliable, timely BDA.

These problem areas will not be the only ones which occurred during Desert Storm; they are only the initial impressions of areas where we could have performed better. As we continue to study and dissect the lessons learned in the war, others problems will appear.

## Summary

The Air Force's success in Desert Storm stems from quality people, equipment, training, and leadership. Today's airman is the best that has ever been recruited. Articulate, bright, and innovative, these people willingly accept responsibility, and operate sophisticated equipment with skill and pride. They are team players. An incident during the war will highlight this team effort. One F-15 Wing Deputy Commander for Operations praised the efforts of the only maintenance person available when his wing's aircraft arrived at a remote base: "The aircraft had to be turned and put on status, so the Chief did the only thing he could do under the circumstances -- he enlisted cooks, cops and engineers, and had every aircraft ready to go inside an hour." This example attests to the fighting spirit and flexibility of Air Force people during the war. Numerous other examples abound as well.

The Air Force today has the "global reach" and the "global power" to support national security objectives. These comprehensive forces can exploit the speed, range, flexibility, lethality and precision of modern airpower. Desert Storm reflects a commitment to recruiting quality people, providing them with the best equipment and technology available, training them until they gain confidence in their ability and their equipment, and giving them quality leaders to direct them. This formula was a winner in this war. Realistic training at Red Flag and other exercises prepared both pilots and support personnel for war and they performed magnificently. When coupled with innovative planning, aggressive leadership, and near flawless execution, Desert Storm was an unqualified success.